UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,040	08/27/2003	Curtis E. Graber	CUSTO-02004	5139

28270 7590 08/23/2007

O'MALLEY AND FIRESTONE
919 SOUTH HARRISON STREET
SUITE 210
FORT WAYNE, IN 46802

EXAMINER	
KURR, JASON RICHARD	
ART UNIT	**PAPER NUMBER**
2615	

MAIL DATE	DELIVERY MODE
08/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/649,040	GRABER, CURTIS E.	
	Examiner	Art Unit	
	Jason R. Kurr	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim 5 has been cancelled and will not be considered by the Examiner.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 21, 2007 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 10-12 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Danley (US 4,845,759).

With respect to claim 1, Danley discloses a loudspeaker comprising: an enclosure including a folded horn having a base end (fig.6 "end where throat #46 meets drivers #40,42,44") and a mouth (fig.4 #48); a summing throat forming a portion of the folded horn including the base end, (fig.6 "portion where throats #46 meet") the

summing throat defining a direction of acoustic energy propagating to promote synchronous and constructive summing of inputs to an acoustic pressure wave building cumulatively through the summing throat from the base end toward the mouth; a plurality of acoustic transducers housed in the enclosure (fig.6 #40,42,44); and a plurality of radiating outlets (fig.6 #46), with at least one radiating port being coupled with each acoustic transducer for transmitting acoustic energy from the acoustic transducers into the summing throat; the radiating outlets being disposed at acoustically spaced locations along the summing throat progressing from the base end forward toward the mouth to initiate and synchronously reinforce the acoustic pressure wave as it moves from the base end toward the mouth (fig.2, col.2 ln.59-66).

With respect to claim 2, Danley discloses a loudspeaker as set forth in claim 1, further comprising: a source of an acoustic range signal (fig.3 "AMP"); and transducer drive signal processing circuitry (fig.6 #60) having an individual channel for each of the audio transducers, the individual channels each being coupled to receive the acoustic range signal and each channel including means (fig.3 #32) for setting a relative phase angle for the acoustic range signal in a channel as a function of the acoustic spacing of the radiating outlets to build an acoustic pressure wave in a cascade in the summing throat toward the mouth (col.2 ln.67-68, col.3 ln.1-15).

With respect to claim 3, Danley discloses a loudspeaker as set forth in claim 2, further comprising: a plurality of high pressure chambers (fig.6 #46), at least one acoustic transducer being positioned to direct sound energy into each high pressure

chamber, each high pressure chamber further having an elongated port to one of the radiating outlets (fig.6).

With respect to claim 10, Danley discloses an apparatus comprising: a plurality of high pressure chambers (fig.6 #46) substantially the same volume (fig.6); a plurality of extended acoustic ports, each extended acoustic port (fig.4 #54) having a constant cross-sectional area and each providing a outlet constricting the outflow of air from the high pressure chambers (fig.6 #46); a horn having a summing section (fig.6 "portion where throats #46 meet") and a mouth (fig.4 #48), the summing section comprising a base end (fig.6 "end where throat #46 meets drivers #40,42,44") of the horn furthest removed from the mouth and a waveguide (fig.6 #46); the extended acoustic ports being connected into the summing section at acoustically spaced locations with one at the base end of the horn and subsequent acoustic ports located at sequentially closer locations to the mouth (fig.2) to support a cascade buildup of an acoustic pressure wave; and a plurality of identical acoustic pressure wave generators (fig.6 #40,42,44), one of each being coupled to radiate into each high pressure chamber.

With respect to claim 11, Danley discloses the apparatus as claimed in claim 10, further comprising: means (fig.3 #32) for coordinating operation of the acoustic pressure wave generators so that the pressure waves from the radiating ends of the acoustic ports reinforce one another (col.2 ln.67-68, col.3 ln.1-15).

With respect to claim 12, Danley discloses the apparatus as claimed in claim 11, wherein the acoustic pressure wave generators are substantially identical transducers and are aligned side by side (fig.6).

With respect to claim 14, Danley discloses the apparatus as claimed in claim 11, the means for coordinating further comprising drive circuitry for the acoustic pressure wave generators including delay means (fig.3 #32) for synchronizing merger of the pressure waves upon their meeting in the summing section (col.1 ln.42-48).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4, 9 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danley (US 4,845,759) in view of Ohta (US 2001/0016045 A1).

With respect to claim 4, Danley discloses a loudspeaker as set forth in claim 3, however does not disclose expressly wherein each channel of the transducer drive signal processing circuitry further comprising: a band pass filter receiving the acoustic range signal and producing a filtered signal therefrom; the time delay element receiving filtered signal and producing a delayed, filtered signal; and a dynamic phase adjustment element receiving the delayed, filtered signal and adjusting the phase of the signal as a function of frequency to produce a drive signal for an acoustic transducer.

Ohta discloses a system for correcting a sound field in an audio system wherein a plurality of channels of a transducer drive processing circuitry (fig.2 #2) connected to respective speakers each comprise: a band pass filter (fig.2 "BPF 2-5") receiving an

acoustic range signal (fig.2 #3) and producing a filtered signal therefrom, and a dynamic phase adjustment element (fig.2 "Delay Circuit") receiving the filtered signal and adjusting the phase of the signal as a function of frequency to produce a drive signal for an acoustic transducer (pg.4 [0055]).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the sound field correcting system of Ohta in the invention of Danley. The output of the band pass filter of Ohta would have supplied a filtered signal for the delay means of Danley, still allowing for adjustment in the dispersion pattern of the disclosed horn. Providing the additional phase adjustment element of Ohta would have allowed for the invention of Danley to compensate for various acoustic environments.

The motivation for using the sound field correcting features of Ohta in the invention of Danley would have been to allow the system to correct sound field anomalies resulting from imperfect acoustic environments, more specifically frequency and delay characteristics. This would provide a listener within the environment a more realistic reproduced sound, absent of distortions resulted from the acoustic environment.

With respect to claim 9, Danley discloses a loudspeaker as set forth in claim 4 in view of Ohta, wherein the band pass filters, delay elements and dynamic phase adjustment elements are realized in a digital signal processor (Danley: col.3 ln.7-10)(Ohta: fig.2 #2, pg.3 [0036]).

With respect to claim 15, Danley discloses the apparatus as claimed in claim 14, however does not disclose expressly wherein the drive circuitry includes a pass band filter associated with each of the acoustic pressure wave generators and a dynamic phase adjustment element for each of the acoustic pressure wave generators.

Ohta discloses a system for correcting a sound field in an audio system wherein a plurality of channels of a transducer drive processing circuitry (fig.2 #2) connected to respective speakers each comprise: a band pass filter (fig.2 "BPF 2-5") receiving an acoustic range signal (fig.2 #3) and producing a filtered signal therefrom, and a dynamic phase adjustment element (fig.2 "Delay Circuit") receiving the filtered signal and adjusting the phase of the signal as a function of frequency to produce a drive signal for an acoustic pressure wave generator (pg.4 [0055]).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the sound field correcting system of Ohta in the invention of Danley. The output of the band pass filter of Ohta would have supplied a filtered signal for the delay means of Danley, still allowing for adjustment in the dispersion pattern of the disclosed horn. Providing the additional phase adjustment element of Ohta would have allowed for the invention of Danley to compensate for various acoustic environments.

The motivation for using the sound field correcting features of Ohta in the invention of Danley would have been to allow the system to correct sound field anomalies resulting from imperfect acoustic environments, more specifically frequency and delay characteristics. This would provide a listener within the environment a more

realistic reproduced sound, absent of distortions resulted from the acoustic environment.

Claims 6-8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danley (US 4,845,759) "Danley1", in view of Danley et al (US 6,411,718 B1) "Danley2".

With respect to claim 6, Danley1 discloses a loudspeaker as set forth in claim 4, further comprising: the acoustic transducers having a small vibrational surface area relative to the predominant range of frequencies to be reproduced (fig.6 #40,42,44); however does not disclose expressly wherein the loudspeaker further comprises a plurality of sealed back chambers, one sealed back chamber housing each acoustic transducer.

Danley2 discloses a loudspeaker wherein the loudspeaker further comprises a plurality of sealed back chambers (fig.2C "not labeled"), one sealed back chamber housing each acoustic transducer (fig.2C #50,52,46,48).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the sealed back chambers of Danley2 on the transducers of Danley1.

The motivation for doing so would have been to protect the drivers of the transducers from being damaged from external foreign objects.

With respect to claim 7, Danley1 discloses a loudspeaker as set forth in claim 6, further comprising: the audio transducers being positioned with respect to one another in a linear array, one to each high pressure chamber (fig.6).

With respect to claim 8, Danley1 discloses a loudspeaker as set forth in claim 6, further comprising: a plurality of acoustic transducers (fig.6 #40,42,44) coupled to each high pressure chamber (fig.6 #46).

With respect to claim 13, Danley1 discloses the apparatus as claimed in claim 11, however does not disclose expressly wherein the acoustic transducers are housed in sealed back chambers.

Danley2 discloses an apparatus wherein the acoustic transducers (fig.2C #50,52,46,48) are housed in sealed back chambers (fig.2C "not labeled").

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the sealed back chambers of Danley2 on the transducers of Danley1.

The motivation for doing so would have been to protect the drivers of the transducers from being damaged from external foreign objects.

Response to Arguments

Applicant's arguments filed January 3, 2007 have been fully considered but they are not persuasive.

With respect to the Applicant's arguments regarding claim 1 on pages 8 and 9 of the Remarks, the Applicant argues that Danley does not disclose a **folded** horn. The

Applicant continues that a folded horn is a term that is used in the art and therefor well known. The Examiner maintain the position set forth in the Final Rejection dated April 20, 2007 and would like to note that there are not universal guidelines as to the degree of bend in a horn that is required so as to be classified as a folded horn. Furthermore, the Applicant never defines in the claim language as to limit the meaning of "folded horn", therefor the Examiner is free to broadly interpret this term in any manner consistent with the term. In the present case, the horn as shown in figure 6 of Danley comprises numerous bends in the throat. These bends have been interpreted by the Examiner as folds, hence a folded horn. The Applicant continues to define the term "folded" as "an acoustic horn in which the path from the throat to mouth is folded or curved to give the longest possible path in a given volume". This definition does not exclude the horn of Danley as being folded, as can be seen in figure 6. The acoustic path from the throat to mouth is curved so as to lengthen the path of the emitted acoustic waves. The Examiner would also like to note that the present claim language does not limit the scope of the term "folded" as to provide any suggestion that the invention of Danley does not qualify as a folded horn.

With respect to the Applicant's arguments on page 10, the Applicant argues that Danley does not teach a "cascade buildup" of acoustic pressure waves, and continues that cascaded devices are defined, as "the output of one device provides the input to the next device". The Examiner agrees with this definition of cascaded devices, however this is not disclosed by claims 2 and 10. The present claims merely disclose a cascade build up of acoustic pressure waves, not a relation of cascaded devices.

Simply using the term "cascade" does not specify the action of building up acoustic pressure waves so as to exclude the teachings of Danley. Danley clearly discloses the build up of multiple acoustic pressure waves in a summing portion of the horn (fig.6).

With respect to Applicant's arguments on page 11, the Applicant asserts that the Examiner has erred in construing slots 54 as "extended ports", and that the throats 46 do not appear to have a constant cross-sectional area. The Examiner maintains that the slots 54 are considered to be extended ports that constrict airflow out of the chamber. Any physical structure that reflects and redirects the propagation pattern of an acoustic pressure wave such as a horn as disclosed by Danley (fig.6), constricts airflow. The present claims merely state that the acoustic ports have a constant cross-sectional area. This is not defined as being constant from throat to mouth by the claim; therefor any cross-sectional area remains constant when not compared to another cross-section. Danley also discloses an alternative embodiment in figure 5, wherein the acoustic port has a constant cross-sectional area from throat to mouth. The Applicant also argues that Danley does not disclose a "high pressure chamber". The Applicant never defines or limits the structure of a "chamber" in the claim language; therefor the Examiner is free to broadly interpret this term in any manner consistent with the term. In the present case the acoustic throats #46 of Danley have been considered by the Examiner as chambers that receive high-pressure acoustic waves from the drivers #40,42,44, hence they are "high pressure chambers".

Applicant continues to argue on page 12, that Danley simply does not show or teach enough structure to simultaneously meet the requirements of both a plurality of

throats and a distinct summing throat. The Examiner disagrees with this assertion and maintains the position set forth in the Final Rejection dated April 20, 2007. It can clearly be seen in figure 6 that each acoustic driver #40,42,44 contains its own throat #46 that leads to a larger cavity (summing throat) of the horn. The acoustic waves emitted from the drivers are constructively combined in this portion of the horn so as to increase the output power of the horn through the combined efforts of multiple sources as disclosed by Danley (col.2 ln.33-51).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason R. Kurr whose telephone number is (571) 272-0552. The examiner can normally be reached on M-F 10:00am to 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571) 273-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JK

JK

VIVIAN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600